

CLAIMS

What is claimed is:

1. Method of filling cells of a mask with a viscous material, comprising:
 - with a first blade disposed a distance above a front surface of the mask, and with a glob of viscous material in front of the first blade, advancing the first blade across the surface of the mask; and
 - with a second blade in contact with the surface of the mask, advancing the second blade across the surface of the mask to remove residual viscous material from the surface of the mask.
2. Method, according to claim 1, wherein the viscous material is solder paste.
3. Method, according to claim 1, wherein:
 - the viscous material comprises particles having an average particle size; and
 - the distance is equal to a few average particle sizes.
4. Method, according to claim 1, wherein:
 - the first blade is made of a plastic material.
5. Method, according to claim 1, wherein:
 - the second blade is moved in unison with the first blade, across the mask.
6. A set of blades for filling cells of a mask with solder paste, comprising:
 - a first, flood blade which is generally rectangular in cross-section, having a leading surface, a trailing which is generally parallel to the leading surface, and a side edge which is generally perpendicular to the leading and trailing surfaces and which, in use, is disposed opposing the mask, wherein the side edge is chamfered (beveled) so as to present a sloping surface for pushing the solder paste down into the cells of the mask when the first blade is moved across the mask; and
 - a cleaning blade for clearing residual solder paste from the mask.

7. A set of blades, according to claim 6, wherein:

the side edge has a first area which is flat and perpendicular to the trailing surface, followed by a second area which forms approximately a 45-degree angle with the first area, followed by a third area which forms a steeper, approximately 60-degree angle with the first area.

8. A set of blades, according to claim 6, wherein:

the side edge is beveled to direct and force solder paste into the cells of the mask.

9. A set of blades, according to claim 6, wherein the first blade has an overall thickness and the sides edge comprises:

a flat area and at least one beveled area, and the flat area comprises approximately 75% of the overall blade thickness.

10. A set of blades, according to claim 6, wherein:

the cleaning blade comprises a relatively non-compliant material, such as metal.

11. A set of blades, according to claim 6, wherein:

an end portion of the cleaning blade forms an angle of 30-60 degrees with the surface of the mask.

12. A set of blades, according to claim 6, wherein:

the cleaning blade comprises an end portion which extends from a base portion; and the base portion extends substantially parallel to the first, flood blade.

13. A set of blades, according to claim 6, wherein:

the cleaning blade comprises an end portion which extends from a base portion; and the base portion is sufficiently long to prevent chatter.

14. Method of printing a sequence of masks with solder paste, comprising:

positioning a first mask between a first print landing areas and a second print landing area; with a first set of blades parked at the first landing area, disposing a glob of solder paste in front of the first set of blades;

advancing the first set of blades advances across the towards the second print landing area to fill the cells of the first mask with solder paste;

continuing to advance the first set of blades until it is entirely beyond the mask, and residual solder paste that is being pushed forward is on the second print landing area;

then, retracting the first set of blades;

removing the first mask, and positioning a second mask between the two print landing areas;

with a second set of blades, starting from the second print landing area, pushing the solder paste entirely across the second mask to fill the cells of the second mask, until residual solder paste that is being pushed forward is on the first print landing area.

15. Method of filling cells of a mask with a viscous material, comprising:
 - disposing a quantity of the viscous material on a surface of the mask;
 - bringing a first blade to a distance of a few mils from the surface of the mask;
 - contacting the mask with a cleaning blade;
 - advancing the print blade across the surface of the mask to fill the cells; and
 - advancing the cleaning blade across the surface of the mask, behind the print blade.
16. Method, according to claim 15, wherein:
 - the viscous material is solder paste.
17. Method for forming solder balls on a substrate having a plurality of pads on a surface thereof, comprising:
 - providing a mask having a plurality of cells;
 - filling the cells of the mask with solder paste by filling the cells of the mask with a flood blade spaced a distance from the surface of the mask and moving across the mask followed by a cleaning blade in contact with the surface of the mask and moving across the mask;

with the mask disposed on the surface of the substrate, reflowing the solder material; and separating the substrate from the mask.

18. Method, according to claim 17, wherein:
the cells extend entirely through the mask.